JACC Vol. 10, No. 2
August 1987:18A–21A

Cardiovascular Care of the Elderly: Economic Considerations

WILLIAM B. STASON, MD, MSc, CHAIR, CHARLES A. SANDERS, MD, FACC,
HUGH C. SMITH, MD, FACC

Escalating costs of medical care have stimulated dramatic changes in the organization and financing of health care in the United States. Prospective payment for hospitalizations, the growth of Health Maintenance Organizations, increased emphasis on fee schedules and salaried arrangements to reimburse physicians and trends toward increased use of ambulatory services, day surgery and home care services are some of the manifestations of change. Priorities for health care are being reconsidered, and the prospects for future rationing of medical services are real.

This environment creates important opportunities, as well as challenges, for the practicing physician and for organized medicine, including the American College of Cardiology. On the one hand, it provides a stimulus to the medical profession to reassess the traditional norms of medical practice and to consider seriously how cost control can be achieved without adverse effects on the quality of care. On the other hand, it creates incentives for constructive dialogue among physicians, policymakers and the general public to shape the direction of change toward an optimal balance between individual and societal priorities.

The overriding obligation of the physician is to protect the interests of the patient. Fundamental to fulfilling this obligation are preservation of reasonable access to high quality health care and assurance that neither access nor quality will be compromised by considerations of age or of the ability to pay for health care. To put this guiding principle into operation, we need definitions of the "best interests of the patient," "reasonable access" and "high quality." Moreover, arguments that "more is better" have to be supported by convincing evidence that the costs of health care are warranted in terms of the health benefits achieved.

Considerable common ground exists among policymakers, physicians and the general public. This ground has to be carefully explored and creatively tilled.

Factors Affecting the Economics of Health Care in the Elderly

Particular attention is being focused on the elderly in policy debates because of their high and rapidly increasing share of the health care market, the dramatic growth in Medicare expenditures and special considerations related to the cost-effectiveness of health care in the elderly.

Effects of population growth. Persons ≥65 years of age comprise 12% of the U.S. population but consume over one-third of expenditures for health care. Moreover, this age group is increasing in size at a rate that is 2.5 times that of the U.S. population as a whole. Growth is even more rapid among the "oldest old" (persons >85 years of age). Higher prevalences of hypertension, coronary artery disease, cancer and other chronic conditions in older persons and increasingly frequent applications of expensive high technologies in the elderly compound the effects of population growth on health care costs.

Growth of Medicare expenditures. The rapid growth of Medicare expenditures has created a virtual crisis for federal policy makers. Medicare, enacted in 1965, has done much to promote the health and well-being of elderly persons. However, deficiencies have generated broad criticism (1,2). Inflationary policies with regard to physician and hospital reimbursement, unnecessary administrative complexities and expenses, questions of whether the burden of financing the program is equitably distributed and Medicare's failure to cover adequately the costs of long-term care and catastrophic illnesses are some of the major targets of criticism. Reform is underway. Prospective payment for hospital care (Diagnosis Related Groups [DRGs]) has been enacted; changes in mechanisms for physician reimbursement are under development and it is hoped that better financial coverage for medications, primary care and preventive services and long-term care will follow.

Cost-effectiveness of medical care for the elderly. Finally, attention has been drawn to health care for the elderly because of the effects of age and comorbidity on the cost-effectiveness of medical care. The costs of care for a given episode of illness are higher in older than in younger persons because greater comorbidity and more frequent complications lead to longer hospitalizations and increased need for intensive care. At the same time, the health benefits of treatments in the elderly are often less. Higher risks and reduced potential for prolonging life, as well as coexisting chronic disabilities, detract from expected benefits. Moreover, elderly patients may value improvements in the quality of life more highly than added years of life. If this is so, treatments that relieve symptoms or facilitate functional independence may be more beneficial (and cost-effective) than "life-saving" ones. Clinical and policy decisions alike should reflect such preferences for health outcomes.

0735-1097/87/$3.50

Cardiovascular Care of the Elderly

The treatment of cardiovascular diseases epitomizes both the accomplishments of modern medicine and the economic consequences of these successes. Technologic advances in cardiology have been truly outstanding. Many lives can be saved today, and much suffering relieved, in ways not possible 20 or even 10 years ago. Increases in health costs have been equally dramatic, however, and, increasingly, questions are being raised about costs versus benefits, overutilization of technologies and overpriced procedures.

Utilization and Costs of Cardiovascular Procedures

Coronary bypass surgery. Table 1 summarizes utilization figures for cardiovascular procedures in 1984 (3) and estimates of their costs. More than 200,000 coronary artery bypass operations were performed in the United States; 36% of them were in persons ≥65 years of age. At an average cost of $25,000 (4), $5.1 billion was spent on coronary artery surgery, of which at least $1.8 billion was for surgery in the elderly. The question is whether the health benefits purchased by these dollars were "worth it," or whether the same dollars could have been spent more productively on prevention or maternal and child care, or on improving public education. With little doubt, coronary artery bypass surgery can reduce the severity or relieve angina in many patients whose pain is refractory to medical treatment. Similarly, it has been shown to prolong life in patients with obstruction of the left main coronary artery or three vessel coronary disease (5,6), especially when left ventricular function is decreased (7). Improved survival in patients with less extensive coronary heart disease or with normal left ventricular function is more questionable (7). Also, recent improvements in the treatment of angina by beta-blocking and calcium channel blocking drugs suggest that the full potential of newer medical treatments has not yet been explored (8).

Coronary angioplasty. The frequency with which percutaneous transluminal coronary angioplasty was performed increased dramatically from 26,000 to 46,000 procedures between 1983 and 1984, according to the National Center for Health Statistics (3). In 1984, 26% of these procedures were performed in the elderly. An important question is whether coronary angioplasty is being used primarily in patients who would otherwise be treated medically and, therefore, is cost enhancing; or whether it is substituting for coronary bypass surgery, in which case its use may be cost saving. The answer to this question requires better information than is available at present.

Cardiac pacemakers. The elderly have a virtual corner on the market for cardiac pacemakers, using nearly 80% of the 134,000 units implanted or replaced in 1984. The increased use of dual chamber pacemakers, at $6,000/unit (including the pulse generator and two leads) exclusive of physician and hospital costs, compared with about $4,000/unit (including the pulse generator and one lead) for single chamber devices adds to cost. Cost might be reduced if selection criteria could accurately determine which patients will require only single chamber pacing at the time of implantation and throughout the anticipated lifetime of the patient and of the device (9).

Cardiac catheterization and coronary angiography. Finally, the 570,000 cardiac catheterizations and 292,000 coronary angiographic procedures that were performed in 1984 contribute to the total costs, both directly and through the treatments they generate. Overall, the total cost of cardiovascular procedures in 1984 was about $9 billion, one-third or more of which was for procedures performed in the

Table 1. Utilization and Estimated Costs of Selected Cardiovascular Procedures in the United States in 1984

	No. of Procedures Performed*	Percent >65 Years*	Unit Cost ($hundreds)	Total Cost ($billions)
Coronary artery bypass surgery	202	36	25†	5.1
Percutaneous transluminal coronary angioplasty	46	26	7‡	0.3
Permanent pacemaker	134	79	7§	0.9
Cardiac catheterization	570	30	3‖	1.7
Coronary angiography	292	31	3‖	0.9
Total				8.9

*See Reference 3. †See Reference 4. ‡*Assumes:* the $7,671 figure derived in the Mayo Clinic (Ref. 13), adjusted downward to compensate for what appears to be an unusually long length of stay (9.4 days) and upward to account for inflation between 1980 and 1984. §*Assumes:* one-fourth of pacemaker insertions involve dual chamber units at $6,000/unit and three-fourths involve single chamber units at $4,000/unit; two days of hospitalization at $500/day; $500 for use of the operating suite; $1,000 for surgeon's fee. ‖*Assumes:* 2 days of hospitalization at $500/day; $500 for use of the catheterization laboratory, $500 for ancillaries and $1,000 for physician fees.

JACC Vol. 10, No. 2
August 1987:18A–21A

elderly. Current trends toward more invasive management of acute myocardial infarction suggest even greater use of procedures and higher costs in future years.

Utilization of cardiovascular procedures. Geographic variations in rates of performance of cardiovascular procedures emphasize the discretionary nature of clinical decisions and raise important questions about over- (or under-) utilization. Use rates in Medicare recipients in 1981 varied threefold among different regions of the country for coronary artery bypass surgery, coronary angiography and pacemaker insertions and varied more than fourfold for exercise testing (Table 2) (10). These variations cannot adequately be explained by geographic differences in disease rates or differences in access. More likely explanations lie in varying practice norms and factors related to the economic incentives in health care.

Costs and benefits: non-high technology medical care. Current emphasis on the costs of "high" technologies should not cause us to ignore the costs and benefits of medical treatment for hypertension or established coronary artery disease or preventive medical services aimed at reducing cardiovascular risk through smoking cessation or dietary changes to lower total serum cholesterol levels. Both hypertension treatment and use of beta-blocking drugs in patients after myocardial infarction are relatively cost-effective (11), and well chosen primary prevention at the community level may even be cost saving. The costs of treatment for hypertension and angina in the elderly are not trivial, however, when one considers that there are as many as 10 million persons >65 years of age with hypertension and at least 3 million with angina in the U.S. Moreover, uncertainties about the efficacy of treatment for isolated systolic hypertension and treatment of very mild hypertension (90 to 94 mm Hg diastolic) raise important questions about the effectiveness, let alone the cost-effectiveness, of widespread pharmacologic treatment for these conditions.

Recommended Cost Reduction Strategies

The American College of Cardiology and other appropriate professional societies should explore all reasonable avenues to cost containment. These include:

Table 2. Geographic Variations in Cardiovascular Procedure Rates in Medicare Beneficiaries, 1981*

Procedure	Rates/10,000 Beneficiaries	
	Mean	Range
Coronary artery bypass surgery	13	7 to 23
Coronary angiography	33	22 to 51
Exercise treadmill testing	75	43 to 182
Pacemaker implantations	50	22 to 64

*Based on Coronary Artery Surgery Study (10).

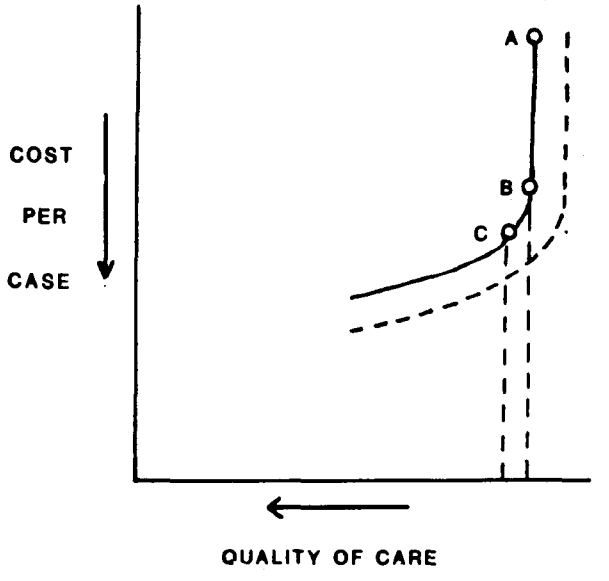
1. Periodic reevaluation of patient selection criteria for cardiac surgery, percutaneous transluminal coronary angioplasty, permanent cardiac pacemakers and other diagnostic and treatment modalities. The best available information should be used to examine the expected benefits and risks in defined patient subgroups and explicit recommendations should be widely promulgated.

2. Efforts to shorten hospital lengths of stay through preoperative outpatient evaluations, optimizing treatment before admission, earlier recognition and treatment of postprocedure complications, better discharge planning and use of skilled nursing facilities. The effectiveness of some of these measures may be compromised in the elderly by limitations imposed by comorbidity or by inadequate social support systems. Nonetheless, they should be vigorously pursued. Current third party reimbursement policies that preclude optimal use of these cost-saving measures should be addressed directly with relevant policymakers. Also to be addressed are the high administrative costs of public health care financing and monitoring systems.

3. Limiting proliferation of technologies. Cost inflation in health care is fostered by pressures created to use (and sometimes overuse) available technologies. In addition, smaller programs are sometimes more costly than large ones because they cannot realize the economies of scale. Efforts should be made to concentrate specialized cardiovascular care on a regional basis. Better quality of care, as well as reduced costs, may result. Decisions on regionalization, however, should be sensitive to the particular access and social support needs of the elderly.

4. Emphasis on prevention. Emerging data suggest that risk factor modification in the elderly may be of value in preventing cardiovascular disease and its complications (see Prevention of Cardiovascular Disease in the Elderly). This

Figure 1. Schematic representation of the trade-offs between cost and quality of care. (Reprinted with permission from [12], 63C.)



is particularly true for smoking cessation and treatment of hypertension. Furthermore, effective prevention programs in younger individuals may pay economic dividends through future reductions in cardiovascular disease. Public education and community level initiatives may be cost-effective approaches to prevention and should be strongly encouraged.

5. Emphasis on individual patient needs. High quality care depends on close physician-patient relations, sensitivity to individual patient preferences and mature clinical judgment. Cost-containment initiatives aimed at more cost-effective use of medical technologies and inpatient services should ensure that these vital components of clinical care are maintained and enhanced.

Cost Containment and the Quality of Care

Possible trade-offs between the costs and quality of care are of concern to policymakers, physicians and the general public alike. The nature of these trade-offs is depicted schematically in Figure 1 (12). Below and to the left of point C, the quality of care increases dramatically as additional resources are used. Incremental costs in relation to benefits are low, and the cost-effectiveness is favorable. Between points C and B, quality continues to increase with costs but at a slower rate. Beyond point B, little, if any, improvement in quality results, and additional resources are essentially wasted.

The ideal situation would be to shift the curve in the directions shown by the dotted lines so that costs are reduced at no loss of quality, or quality is improved with no change or a decrease in costs. This ideal can be achieved when increased efficiency or technologic progress results in lower costs or when unnecessary procedures are omitted. Such opportunities may be more frequent than is usually acknowledged!

The usual case, however, is that additional medical services contribute to the quality of care, but at a cost. The question then becomes how much in additional cost are we willing to incur for a given improvement in quality? Controversial though this question is, it is one that is being asked ever more frequently as the reality of limited resources for health care becomes apparent. It is one to which we must respond.

Cost versus quality of cardiovascular care. Resolution of concerns about cost and quality trade-offs depend fundamentally on a functional definition of quality and on systematic assessment of health care activities with respect to this standard. Any adverse effect of cost-containment initiatives can then be identified.

At present, no adequate definition of quality exists for cardiovascular care. Such a yardstick should include measures of access and appropriateness of utilization, mortality and morbidity (or complication) rates, and, importantly, measures of achieved functionality, independence in living and patient satisfaction. Moreover, a definition of quality should reflect differences in patient preferences for alternative health outcomes and, in particular, should be sensitive to differences in value systems between older and younger age groups and among cultural groups.

The American College of Cardiology's conference on cost containment concluded that ". . . cost containment and excellent cardiologic care are compatible, if wise and useful assessment of each cost intervention is made. Our major responsibility is to continually assess such interventions and their impact on care" (13). The recommendations of this 18th Bethesda Conference should take the next step in this initiative by making development of national quality standards for the care of patients with cardiovascular disease a high priority. It should further encourage and assist in the formulation of plans to assess quality and costs of care in an ongoing manner so that cost and quality trade-offs in the future can be better identified than they have been in the past.

References

1. Blumenthal D, Schlesinger M, Drumheller PB. The future of Medicare. N Engl J Med 1986;314:722–8.
2. Himmelstein DU, Wollhander S. Cost without benefit. Administration waste in U.S. health care. N Engl J Med 1986;314:441–5.
3. Data from the National Hospital Discharge Survey, 1984. National Center for Health Statistics, personal communication.
4. Preston TA. Medicine: marketing an operation. Atlantic Monthly. 1984 Dec:32–40.
5. Takaro T, Hultgren HN, Detre KM, Peduzzi P. The Veterans Administration Cooperative Study of Stable Angina: current status. Circulation 1982;65(suppl II):II-60–7.
6. European Coronary Surgery Study Group. Prospective randomized study of coronary artery bypass surgery in stable angina patients: a progress report in survival. Circulation 1982 65(suppl II):II-67–71.
7. Coronary Artery Surgery Study (CASS). A randomized trial of coronary artery bypass surgery. Survival data. Circulation 1983;68:939–50.
8. Braunwald E. Effects of coronary artery bypass grafting on survival. Implications of the randomized coronary artery surgery study. N Engl J Med 1983;309:1181–4.
9. Ausubel K, Furman S. The pacemaker syndrome. Ann Intern Med 1985;103:420–9.
10. Chassin MR, Brook RH, Park RE, et al. Variations in the use of medical and surgical services by the Medicare population. N Engl J Med 1986;314:285–90.
11. Weinstein MC, Stason WB. Cost-effectiveness of interventions to prevent or treat coronary heart disease. Annu Rev Public Health 1985;6: 41–63.
12. Workshop 1. Quality of cardiologic care in the era of cost containment. In: Harrison DC, ed. A Symposium: Cost Containment Issues in Cardiology. Am J Cardiol 1985;56:62C–4C.
13. Reeder GS, Krishan I, Nobrega FT, et al. Is percutaneous coronary angioplasty less expensive than bypass surgery? N Engl J Med 1984;311: 1157–62.